BIOCHEMICAL ANALYSIS OF EDIBLE MUSHROOM *PLEUROTUS FLORIDA* (MONT.) SINGER USING DIFFERENT SUBSTRATES

[1st] Shyni A.R, [2nd]Irene Wilsy J, [3rd] Reginald Appavoo M

[1st] Research Scholar, [2nd] Associate Professor, [3rd] Associate Professor

Department of Botany & Research Centre. Scott Christian College (Autonomous),
Nagercoil, Kanyakumari District - 629 003,
(Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamilnadu, India.)

Abstract: Mushrooms have been used as food and food supplements for millennia. It is an important food item concerning human health, nutrition and disease prevention. *Pleurotus* spp. are also rich in medicinal values. Mushrooms are rich in protein, minerals and vitamins and they contain an abundance of essential amino acids. For the investigation of *Pleurotus florida* was used to find out the biochemical analysis in different substrates like, paddy straw, saw dust and coconut mesocarp wastes. The nutritional significance of *Pleurotus florida* cultivated on different substrates was assessed in of terms protein, carbohydrates, lipids, reducing sugar and amino acids. This study proved that the paddy straw substrate showed more biochemical content than other substrates.

Key words: Paddy straw**,** saw dust, coconut mesocarp waste**,** *Pleurotus florida* and Biochemical.

INTRODUCTION

Oyster mushroom (*Pleurotus* spp.) cultivation has increased tremendously throughout the world during the last few decades (Royse, 2002). Oyster mushroom cultivation can play an important role in managing organic wastes whose disposal has become a problem (Das and Mukherjee, 2007). Oyster mushroom can be cultivated in any type of lingo cellulose material like straw, sawdust, rice hull, etc.

Mushrooms with their flavour, texture, nutritional value and high productivity per unit area have been identified as an excellent food source to alleviate malnutrition in developing countries (Eswaran and Ramabadran, 2000). Among the reasons for the quick acceptance of mushroom is its nutritive content. Mushrooms are eaten as meat substitutes and flavouring. In general edible mushrooms are low in fat and calories, rich in vitamin B and C, contain more protein than any other food of plant origin and are also a good source of mineral nutrients (Bahl, 1998).

Mushrooms have a long history of use as a source of food but also for their medicinal properties. The nutritive value of mushrooms is attributed to their high content of important amino acids, vitamins, minerals and low lipid content. The genus *Pleurotus* is one of the most diverse groups of cultivated mushrooms with high nutritional value, therapeutic properties and endowed with various environmental and biotechnological applications. *Pleurotus* are cultured on a wide variety of agro forestry products for the production of food, enzymes, and medicinal products (Andrew *et al*. 2007).

MATERIALS AND METHODS

Collection of materials:

The edible mushroom *Pleurotus florida* (Mont.) was collected from Vellayani Agriculure college Thiruvanthapuram. Mother spawn was raised from the fruit body of *Pleurotus florida* which appeared on the substrates incubated with the spawn material. The different substrates used were paddy straw, saw dust and coconut mesocarp waste. The biochemicals like Protein by Lowry *et al*., (1951), Carohydrates by Dubios *et al*., (1956), lipids by Raguramamulu *et al*., (2003), Amino acid by Moore *et al*., (1948), and reducing sugar by Miller, G.L. (1972) were analyzed.

Preparation of mushroom bed:

Mushrooms beds were prepared using paddy straw, saw dust and coconut mesocarp waste in order to find out the biochemicals of mushroom. The substrates were sterilized in autoclave at 15 lbs pressure for 20 minutes. Polythene bags in the size of 30 x 60 cm was filled with the sterilized paddy straw, coconut mesocarp waste and saw dust. Spawn and substrates should be filled as a series of sandwich. The mouth of poly propylene bag was tied and cool in a shady room. Holes were made over the poly propylene bags for aeration and sprinkled with water 3-4 times per day. After 20 days *Pleurotus florida* mycelia observed all over the substrates. The fruit bodies grown were harvested. The same procedures was followed for the remaining substrates.

RESULTS AND DISCUSSION

The *Pleurotus florida* cultivated using different substrates namely, paddy straw, coconut mesocarp waste and saw dust were subjected to biochemical analysis Table 1, 2 & 3

Biochemical analysis of *Pleurotus florida* in paddy straw

The maximum protein content of *Pleurotus florida* (Table.1.) was observed in paddy straw (45.12 mg/g) in mature basidiocarp followed by young (43.45 mg/g) and senescent (35.36 mg/g). This correlated with the findings by Jean-Phillip (2004). Carbohydrates content was maximum in young basidiocarp (35.23mg/g) and minimum in senescent stage (25.10 mg/g). Similar findings were reported by Breyer *et al.*, (2012). Amino acid and reducing sugar showed maximum in young basidiocarp followed by mature and senescent mushroom. Lipids showed maximum in senescent stage (2.59 mg/g) and minimum in young basidiocarp (2.20 mg/g). The oyster mushroom are one of the most delicious foods due to their high nutritional value (Shah *et al.*, 2004).

Table 1. Biochemical analysis of *Pleurotus florida* in paddy straw

Substrate	Biochemicals (mg/gm)	Different stages		
		Young	Mature	Senescent
Paddy straw	Protein	43.45	45.12	35.36
	Carbohydrate	35.23	30.40	25.10
	Lipids	2.20	2.46	2.59
	Reducing sugar	32.45	31.67	28.08
	Amino acid	34.21	29.45	22.45

Biochemical analysis of *Pleurotus florida* in sawdust

In sawdust (Table.2) the mature basidiocarp of *Pleurotus florida* showed maximum protein content (38.96 mg/g) and minimum in senescent mushroom (28.93 mg/g). This result are in consonant with the report of Ashraf *et al.*, (2013). Carbohydrate content was maximum in mature stage (36.14 mg/g) and minimum in senescent basidiocarp (29.10 mg/g). Lipids, reducing sugar and amino acid showed maximum in young basidiocarp minimum in senescent mushroom. Similar reports were observed by Ahmed *et al.*, (2009).

Table 2. Biochemical analysis of *Pleurotus florida* in sawdust

Substrate	Biochemicals (mg/gm)	Different stages		
		Young	Mature	Senescent
Saw dust	Protein	33.45	38.96	28.93
	Carbohydrate	32.12	36.14	29.10
	Lipids	2.54	2.42	2.32
	Reducing sugar	32.14	22.89	21.67
	Amino acid	31.45	20.10	18.90

Biochemical analysis of *Pleurotus florida* in coconut mesocarp wastes

In *Pleurotus florida* (Table.3) the coconut mesocarp waste showed maximum protein content in young basiodiocarp (36.13 mg/g) and minimum in senescent mushroom (26.12 mg/g). Carbohydrate, aminoacid and reducing sugar showed highest protein content in young basiodiocarp and followed by mature and senescent mushroom. Lipids showed maximum in mature stage followed by young and senescent mushroom. This findings correlate with the findings of Alam *et al*., (2007); Mosisa *et al.*, (2015).

Table. 3. Biochemical analysis of *Pleurotus florida* in coconut mesocarp wastes

Substrate	Biochemicals (mg/gm)	Different stages		
		Young	Mature	Senescent
Coconut mesocarp waste	Protein	36.13	35.45	26.12
	Carbohydrate	30.16	29.54	22.60
	Lipids	2.59	2.76	2.16
	Reducing sugar	32.89	30.12	29.14
	Amino acid	29.67	26.43	23.13

CONCLUSION

Mushrooms are rich in protein but poor in fat i.e lipid and good amount of reducing sugars. Biochemical studies proved that *Pleurotus florida* contain higher percentage of proteins, carbohydrates, reducing sugar, aminoacid and lower percentage of lipids. The substrate paddy straw showed the highest protein content compared to other substrates. Mushroom provide a rich addition of nutrients to the diet in the form of protein, carbohydrate valuable salts and vitamins. The cultivation of mushroom is a way to overcome the problem of pollution caused by the different crop residues, because the fungi have the ability to recycle these wastes and convert them into usable forms.

ACKNOWLEDGEMENT

The authors thank the department of Botany and Research Centre, Scott Christian college (Autonomous), Nagercoil for providing laboratory facilities during the period of this research.

REFERENCES

[1] Ahmed Syed Abrar, Kadam J.A., Mane V.P., Patil S.S and Baig MMV (2009). Biological efficiency and Nutritional contents of *Pleurotus florida* (Mont) Singers cultivated on different agro wastes .*Nature and science* ; 7(1): 44-48.

[2] Alam N, Khan A, Hossain M.S., Amin SMR, Khan L.A (2007). Nutritional analysis of diatary mushroom *Pleurotus florida* and *Pleurotus sajorcaju. Bangladesh J. Mushroom*:1(2) 1-7.

[3] Andrew, G., Mirjan, S., Juru, P. (2007). Cultivation techniques and medicinal *Pleurotus* species. *Food Technology and Biotechnology* 45, 238–249.

[4] Ashraf J, M.D. Ali, Ahmad W, M.D. Ayyub C, Shafi J (2013). Effect of different substrates supplements on oyster mushroom (*Pleurotus spp.)* production. *Food science and Technology*.3; 1 (3): 44-51.

[5] Bahl, N. (1998). Hand book on mushrooms. *Oxford & IBH Publishing co Pvt Ltd*. Pp.15-40.

[6] Das, N. and Mukherjee, M. (2007). Cultivation of *Pleurotus ostreatus* on weed plants. *Bio Resource Technology 98*: 2723 – 2726. *www.science direct.com retrieved*..

[7] Dubios M, Gilles K.A., Hamiliton J.K, Robers P.A and Smith F (1956). Colorimetric method for determination of sugars. *Analytical chhmistry* 28:350-356.

[8] Eswaran, A. and Ramabadran, R. (2000). Studies on some physiological, cultural and post harvest aspects of oyster mushroom, *Pleurotus eous. Tropical Agricultural Research*. 12: 360 – 374.

[9] Jean- Phillippe Sharon Rose (2005). Antioxident properties of some edible fungi in the genus Pleuotus. *Master's Thesis, University of Tennessee, USA.*

[10] Lowry O. H., Rose brough N. J. and Randall R .J. (1951). Protein measurement with the folin phenol reagent. *Journal of Biological Chemistry*., 193 : 265 – 275.

[11] M.F, Breyer CA, Longhi RF & Oviedo MSVP (2010). Determining the basic composition and total phenolic compounds of *Pleurotus sajor – caju* cultivated in three different substrates by solid state bioprocess. *Journal of Biotechnology* and *Bio diversity* 3(2):11-14.

[12] Miller G. L *(*1972*)*.Use of DNS reagent for the determination of glucose. *Anal*. *Chem*. 31: 426-428.

[13] Moore, S., and Stein, W.H. (1948). Photometric Ninhydrin Method for Use in Chromatography of Amino Acids. *J Biol Chem.*176:367-388.

[14] Mosisa Zinabu Hamsalu, Kebede Ameha, and Preetha VV (2015). Cultivation of selected *Pleurotus* species using waste paper and leaves of *Prosopis juliflora* sw *dc.I.J.of Ada Researc*h; 3(2) : 522-531.

[15] Raguramamula N, Madhavan N.K and Kalyanasundaram.S, (2003). A manual of laboratory techniques. *National institute of nutrition ICMR Hydrabad, India* 3(2): 56-58.

[16] Royse, D.J. (2002). Influence of spawn rate and commercial delayed release of nutrient levels on *Pleurotus* conocopiae yield, size and time to production. *Applied Microbiology and Biotechnology*. 17: 191 – 200.

[17] Shah Z.A., Ashraf, M. & Ishtiaq, C.H. (2004). Comparative study on cultivation and yield performance of oyster mushroom *(Pleurotus ostreatus*) on didderent substrates wheat straw, leaves, saw dust. *Pakistan J.Nut*. 3:158-160.